

CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

Precision sports such as archery is a fine, steady and coordinated action of many physiological organs, like the visual organs, the proprioceptors, the motor effectors and systems like the neurogenic, respiratory, cardiovascular, endocrinous and locomotor system. Unlike to most sport activities, target sports like archery requires the elimination of any movement that could perturb the stability of the system bow, to achieve the best performance on the target (Gianikellis K., 2000). According to many trainers, athletes and training books, postural stability is one of the most important factors that influence on the performance in precision sports. As stated by KiSik L. and Robert D.B (2005), the foundation of the shot is the static alignment of the body and the equipment that leads to a stable shot platform thus helps the archer's shots to be more consistent and less frustrating.

The elements of the foundation of the shot includes the stance, including the foot position and leg alignment; the body position, including the orientation of the hips and rib cage; the archer's center of gravity and maintaining stability; the position of the bow shoulder; the position of the draw shoulder; the position of the bow arm; and the archer's

hand position and grip on the bow handle are also all part of the foundation. The foundation of a shot sets the stage for good shot performance (KiSik L. and Robert D.B., 2005)

Keeping a stable body posture along the overall shooting process is very important as it might significantly affect the results and accuracy of arrow being shot. A good posture is extremely important for balance, string clearance, effective posterior chain use, and shooting mechanics. An ideal posture would see the centre of gravity of the archer centered between the feet (Logan O., 2011). A proper stance is very important to ensure a stable centre of gravity for the archers. The stance in an ideal position at full draw should be upright, balanced and comfortable position (Archery Australia, 2007).

The objective of this research is to study the correlation between the front foot angle and its effect on postural stability with the archer's performance. An experimental work was setup with the cooperation by the archers from Majlis Sukan Negeri Terengganu (MSNT) with an age range of 10 to 20 years old. AMTI Force Plate set is used to obtain the data on the force exerted and postural sway of the archers throughout the arrow shooting process. AMTI Net Force and Bioanalysis software is then used to analyze the data from the force platforms which in turn helps to identify the position or angle of the foot of the archer in order to achieve the research objectives.

1.2 PROBLEM STATEMENT

The main problem of sport technique in precision sports consists in maintaining the body segments as stable as possible in position and orientation. Experimental data in shooting sports proved that the posture that shooters adopt is mechanically unstable as consequence of the interactions among the body segments. In this way shooters and archers try to make their posture more consistent and reproducible reducing the variability of their actions during the aiming and shooting (Gianikellis et al., 1999). In the effort of achieving the best stability, archers also sometimes tend to adjust their body posture according to their instinct which sometimes leads them to adapt this mechanically unstable posture.

The archers normally will take position and place themselves in a comfortable and stable position prior to the drawing phase. The body placement normally starts with the foot placement on the ground to help them gather a stable base as they draw, aim and shoot at the target face. In order to achieve the best performance in archery, having a stable and comfortable stance plays a very important role because the stance will act as a base which supports the whole body structure of the archer throughout the whole arrow shooting process. Having a weak stance can cause the instability of the body thus causing the whole body posture to sway. This mistake can heavily affect the archers' stability especially during aiming phase which requires a very stable and minor movement from the body system.

In this research, an experimental work is executed to study on the relation of front foot angle and the postural sway with the accuracy of the arrow shot by archers. The front foot orientation is analyzed in terms of the angle while the postural sway is analyzed based on the data obtained from the force plates. The performance of the archers is observed based on the score the shot on the target face.

1.3 PROJECT OBJECTIVES

1. To study the correlation between the front foot angle and its effect on postural stability with the archer's performance.
2. To study the differences in the postural sway changes between recurve bow archers and compound bow archers.

1.4 SCOPE OF STUDY

The scope of this research is focused on studying the front foot orientation and the postural sway and its effect on the accuracy of the archers as they draw the bow until the arrow is released. Front foot orientation is analyzed in terms of its angle from the X-axis of